What is the meaning of 4K?
- EBU: four degrees above absolute zero
- 4096x3072, 4096x2048, 4096x2160
- 3840x2160: QuadHD
- UHD (also 7680x4320 [8K], HFR, HDR, WCG, IS)

What is the meaning of a 4K camera?
- Is a single, color-filtered 4K sensor 4K?
  - ~8 Mpels to ~20 Mpels
New “4K” Camera: AJA CION

Optical Low Pass Filter and IR Cut Filter

An integrated OLPF (Optical Low-Pass Filter) reduces unwanted moiré effects while still retaining vital image detail.
Color Filtering Is An Issue

“If [Dalsa & Red One] are 4K, then [Panavision Genesis & Sony F23] are 6K”
- Peter Centen, Thomson Grass Valley, NAB 2008
A 4K Prism Camera Is Possible

“High-Performance Electro-Optic Camera Prototype”
Stephen A. Stough and William A. Hill (Lockheed Martin)

SMPTEJ March 2001
Grass Valley 4K Prototype

- three-chip, prism-based
  - true 4K possible; no color-filtering loss
  - no sensor details yet

- 2/3-inch format
  - B4 lenses usable with no light loss
  - MTF at 4K a different issue

also 3-chip 2/3-inch:
Flovel FZ-B3 ultra-high sensitivity
Shooting “4K”

- **Benefits for HD output**
  - reframing in post
  - image stabilization in post
  - easier filtering
    - oversampling
  - possible single-sensor 3D
- **Increased sharpness**
  - somewhat

Desired HD

Resulting “HD”

4k

**image stabilization or reframing**

3D via side-by-side images on a 4K sensor (e.g., Zepar lenses on Phantom 65)
Why Downconversion Can Be Good

If this is 2160 lines, then the contrast at 1080 lines is 64%.
Why Extraction Might Not Be As Good

MTF %

hypothetical lens MTF

HD

extracted

< HD >

4K

Mark Schubin, SMPTE DC, NAB 2014 May 21
- 4K with external recorder
- color-filtered full-frame (2x 35mm movie frame) 12Mpel sensor
  - ultra-sensitive large pixels: “ISO 409600”
Blackmagic Design 4K Connections

- **Introducing URSA**: Works first 5K, upgradable 4K digital film camera, with built-in 17” monitor, dual card and茫然 regional feature, sweep, setup, and menu. From $5,995.

- **Blackmagic Studio Camera**: Advanced broadcast cameras designed for live production, with built-in optical flow, superb, 1/2" sensor, broadcast tripods, and more. From $1,995.

- **Introducing Teranex Express**: A new series of Pro Tools and online-up, and down, converter with comprehensive world-class outputs, features, and third-party integration. $1,395.

- **ATEM 2 M/E Production Studio 4K**: Introducing the world’s most advanced live production switcher with 18 x Ultra HD inputs, 4 x HD/SDI inputs, and much more. $3,995.

- **New Smart Videohub Routers**: Available in 3G, 6G, and 12G versions, the Videohub is ultra-fast, with built-in control, monitoring, and much more. From $1,995.

- **New DeckLink 4K Cards**: Capture and playback with fast 3G and 12G SDI capture and playback, and much more. From $295.

- **max. 30 fps**

- **12G SDI ULTRA HD**: 60 fps

Mark Schubin, SMPTE DC, NAB 2014 May 21
Must You Change to 4K?

Broadcasting more than 5000 TV channels of which 500 in High Definition

Hint: The other 4500 are not 4K
4K Recap

Pro:
- downconversion to HD
- reframing in post for HD
- S3D HD on one sensor

Con:
- currently less sensitive
- no long zooms (for PL)
- 8x data (uncompressed)
- no connection standard

4K viewing will be covered in the next session
Blackmagic Studio Camera

Advanced broadcast camera designed for live production with built-in optical fiber, super large 10" viewfinder, talkback and tally!

From $1,995
Upgrade Licensing

AMIRA License Options

Explore all AMIRA license options. You can choose between the following AMIRA licenses:

- AMIRA Advanced License Key*
- AMIRA Advanced to Premium License Key*
- AMIRA Premium License Key*
- AMIRA Advanced License Temporary Week*
- AMIRA Advanced to Premium License Temporary Week*
- AMIRA Premium License Temporary Week*

* Will be available soon

tip of the hat to David Leitner
Smart Glasses with Additional Features: 1080p HD Video, 8MP Images, Bluetooth, NFC, WiFi, Micro SD slot, GPS/Gyro, LIVE streaming, Android, LIVE Mod, Fuel Mod, Air Mod.
Hands-free, easy and quick live-broadcasting!

Security

Encryption (AES 256bit)  Connection attestation  Screen operation lock  Still picture capture  Receiving image recording  Image quality mode  Image quality, Frame rate  Auto/ macro focus  Digital zoom  Image external output

Image

3G/LTE

Gather on-site information and give verification and instructions

Transmit a high-quality video and audio stream of on-site situation

image simplex

Sound duplex

A maximum of 12 bases and simultaneous connection are possible.

Head office

Live video transmittable with hands-free!!

Live-broadcasting location is immediately identifiable through GPS information

Mark Schubin, SMPTE DC, NAB 2014 May 21
A Couple More Little Cameras

Crosscast Meduza MCAM to 340 fps

Marshall makes cameras?
Digital Bolex
Acquisition: Mounts

Rushworks PT-Mini

360 VIDEO LIVE AND INTERACTIVE

Want to know more: http://vdstt.ch/live

VideoStitch
California: Airplane Nearly Hit Drone Over Florida in March

By THE ASSOCIATED PRESS   MAY 9, 2014

privacy is just one concern
Storage

- Panasonic
  - ProRes
  - Codex
- Sony
  - Atomos
- Atomos
  - Ninja Star
  - $295
Post-NAB Sony/IBM 185 TB Cassette
Processing: Hardware

- supercomputing
  - Apple MacPro 7 TFLOPS
- computational imaging
  - HDR, reframe & refocus in post, depth capture, increase sensitivity, up-rez, correct lens aberrations, HFR in-betweening
  - no lens at all someday?

Devil: 15.2 TFLOPS CPU + 13.74 TFLOPS GPU (1998 Cray 1.02 TFLOPS)
Processing Software

- Coding
  - HEVC splicing
    - General Dynamics
  - HEVC real-time coding
    - Fraunhofer 4k in 5 Mbps (real-time decoding 2013)

- Effects & Corrections
  - all-in-one edit & grade
    - only Adobe Premiere with captions
  - Academy color-predictor app
  - grading while shooting
    - accurate monitors
Academy Color Predictor App
Subscription Software

- Monthly US $195 SRP
- Quarterly US $545 SRP
- Annual US $1750 SRP

Desktop Subscription Pricing

Available starting May 8th, 2014

portion of photo by David Leitner
Processing Control

Panasonic AV-HS6000
Sound Processing

Fraunhofer Cingo
surround sound for mobile devices
Teradek TeraView
Opinions About the Show

“didn’t have quite the buzz”

The 2014 NAB Show has come and gone, and although attendance was strong, this year’s edition didn’t have quite the buzz that I expected. Given all that is happening with UHDTV currently,
How Cloud Are You?

IDC 3Q13: Chromebooks <1% of PC+tablet sales
http://www.zdnet.com/latest-idc-figures-show-chromebooks-continue-to-struggle-7000023000/
One Cloud Is Scary

- Kim Dotcom’s Megaupload used commercially available cloud servers (Carpathia & Cogent)
- U.S. accused him of copyright infringement
- other customers lost access to their content
- possibilities: storm, fire, etc.
Presentation (oldish)

- projectors as monitors
  - Christie, Epson
- LED walls as monitors
  - Leyard, SiliconCore
- goggles as monitors
  - Zeiss cinemizer OLED
    - 870x500 (x2)
- accurate on-camera
  - Atomos, SmallHD

full-size 1.5 mm pitch
SiliconCore Magnolía
Atomos Shogun with IPS screen & 3D color LUTs

Spyder screen calibrator

Now Shipping!
Sichuan University Future Movie
NHK “8K” “Home” Display
Finally

NetUP IPTV Remote Control